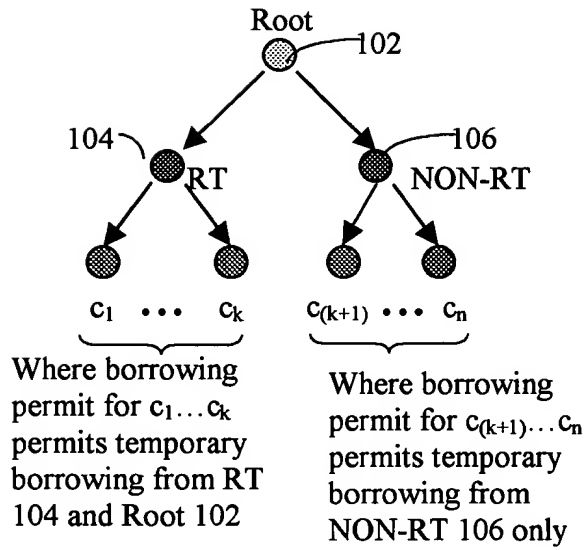
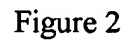


Figure 1





Computer-readable medium/method 310

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measuring a predetermined parameter at predetermined observation window times

dynamically adjusting allocated bandwidth for parent classes of real-time traffic by adjusting an average of the predetermined parameter to have a value within a predetermined stable region

304

306

Where the predetermined parameter is a number of borrowing attempts during a measurement window, a maximum bandwidth and a minimum bandwidth for the predetermined stable region is determined by:

If $A_{i_avg} < Thr(A_i)^{lower}$, $B_i = \text{maximum}(B_i - \omega_i, \text{Min}(B_i))$

Else If $A_{i_avg} > Thr(A_i)^{upper}$, $B_i = \text{minimum}(B_i + \omega_i, \text{Max}(B_i))$

Where exponential smoothing includes:

$A_{i_avg} \leftarrow (1-\alpha) * A_{i_avg} + \alpha * A_i$, where a value of α is preselected as a negative power of two and A_{i_avg} is updated every observation window, a pre-determined parameter in seconds and

the queue length Q_i for class i may be related to the upper bound of delay jitter as:

$$\text{Delay_jitter_i} = Q_i / B_i$$

such that, where the desired jitter upper bound Delay_jitter_i is given, then a linear relationship exists between Q_i and B_i (allocated bandwidth)

308

Where the predetermined parameter is a queue length, a lower threshold and an upper threshold for queue length for the predetermined stable region may be determined by :

If $Q_{i_avg} < Thr(Q_i)^{lower}$, $B_i = \text{maximum}(B_i - \omega_i, \text{Min}(B_i))$

Else If $Q_{i_avg} > Thr(Q_i)^{upper}$, $B_i = \text{minimum}(B_i + \omega_i, \text{Max}(B_i))$,

and $\text{Delay_jitter_i} = \text{max}Q_i / B_i$

wherein, if a jitter upper bound Delay_jitter_i is preselected, then a linear relationship exists between $\text{max}Q_i$ and B_i , an allocated bandwidth.

Fig.
3

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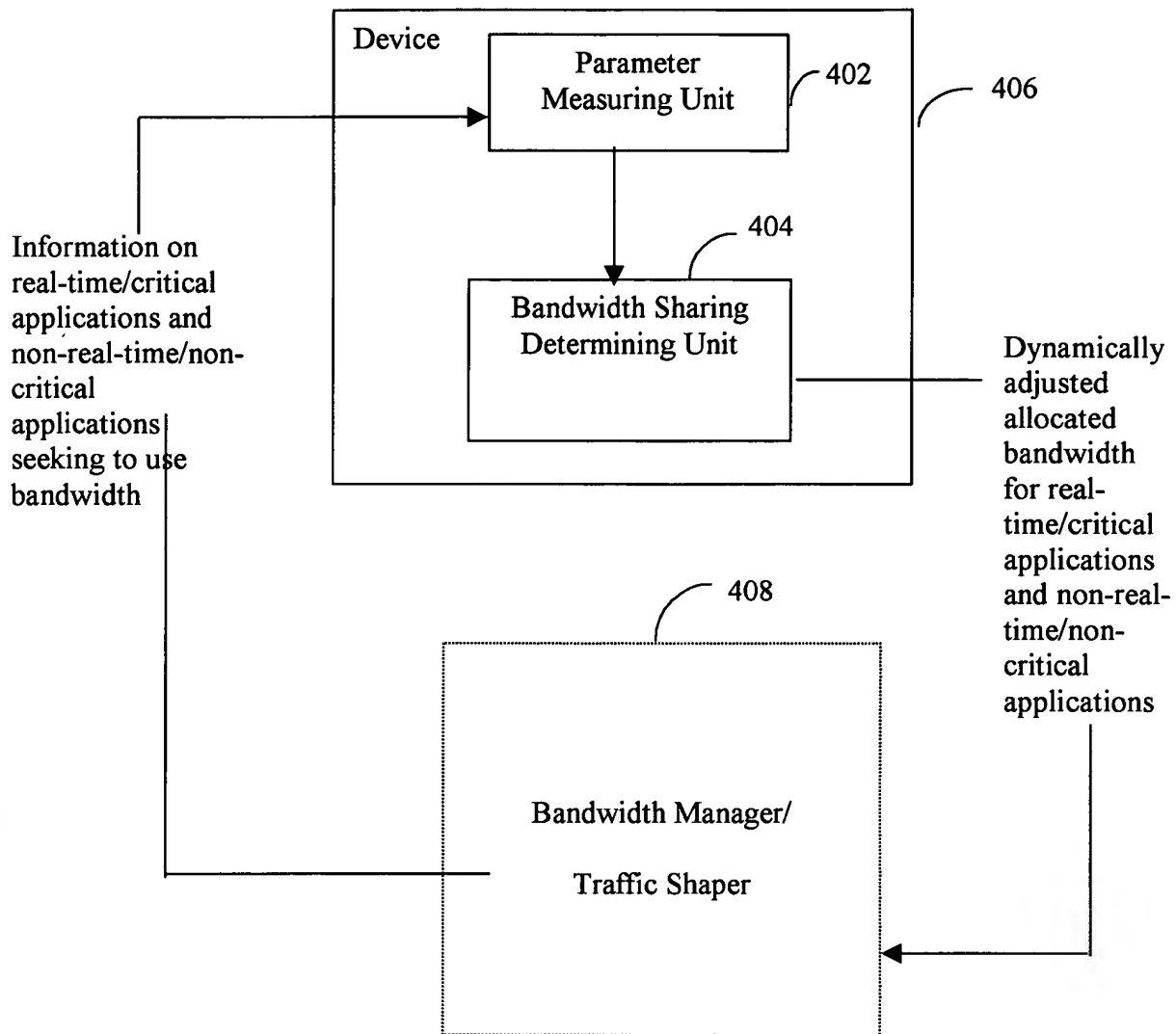


Figure 4